

SCIENCE

[Entered at the Post-Office of New York, N. Y., as Second-Class Matter.]

A WEEKLY NEWSPAPER OF ALL THE ARTS AND SCIENCES.

EIGHTH YEAR.
VOL. XVI. No. 393.

NEW YORK, AUGUST 15, 1890.

SINGLE COPIES, TEN CENTS.
\$3.50 PER YEAR, IN ADVANCE.

THE SCIENTIFIC TESTIMONY OF "FACTS AND OPINIONS."¹

NEARLY twenty years have passed away since Professor A. Graham Bell first appeared before the American public on questions pertaining to the education of the deaf, and from that time until now his interest in this class of people has been deep and unremitting. There have been occasions when his public utterances have drawn the fire of those who differ from him; but it must be admitted that the popular leaders of deaf-mute education in the United States have granted Professor Bell the fullest liberty of investigation, have responded generously to his call for information, and at conferences and conventions have cordially welcomed him to co-operation in the debates and discussions which there take place. This is the true spirit—the only spirit, indeed, which we can afford to manifest toward this popular lay critic of our American schools. The amenities of life have not been altogether on one side. The professor has shown us marks of his favor in the shape of pamphlets and essays, which have provoked discussion and made investigation necessary. It is to be hoped that this spirit of mutual courtesy will continue to subsist. We do, however, venture to enter a gentle protest against the broad charge made against us in the *British Medical Journal* of May 11, 1889, in these words: "Philanthropy in the United States is doing every thing possible to encourage marriage among deaf-mutes. We educate them together, teach them a language of their own, so that they know nothing of English." The first part of this charge is severe enough, but we believe that the author of that statement would admit a little—just a little—hyperbole in "nothing of English." Whatever may be the delinquencies of the great body of men and women now engaged in this noble work, it must be said in their defence that they are as well equipped, as efficiently active, as enlightened in methods, and as fruitful in results, as the best that can be found abroad. We are not, however, to shut our eyes to the criticisms of one honestly seeking the improvement of our methods of instruction. The vast array of facts presented to the public in "Facts and Opinions" are not to be blinked at. They are to be met, if met at all, by a critical consideration of all the facts in the case.

In coming now to a discussion of the scientific testimony of "Facts and Opinions," we ask that we may be permitted to subject the evidence there given to that sifting process which honors no name, respects no authority, which strips itself of all preconceived notions, and chronicles only what investigation proves to be the clean, filtered truth.

¹ By W. G. Jenkins, M.A., instructor in the American Asylum, Hartford, Conn. (from *American Annals of the Deaf* for July).

The symposium collated by the editor in favor of his theory of a deaf-mute variety is interesting mainly for the weighty names by which the theory is indorsed, rather than by any thing of value contributed to the discussion. The presentation of this question before such associations as those that met at New Haven, Washington, and Philadelphia, had this merit, that it won at once the attention of the best thought of the country. Admitting all this, it is still true that the estimable men who composed these scientific bodies knew relatively nothing of the questions at issue; for they were questions pertaining to a particular guild, the members of which were conspicuous by their absence. Nothing could be more presumptuous than for a body of men to attempt to speak *ex cathedra* on questions which are wholly outside of their experience and observation. This is the criticism to which the men who appear in "Facts and Opinions" have justly subjected themselves. Yet this must be remembered in their favor: a member of their own fraternity has asked them their opinion on a theory of his own formulating; and, in complimentary deference to a great name, they have indorsed the theory, on what ground we shall immediately see. Such is the vicarious character of a national reputation, that a man carries with him all the weight of his special equipment, even when passing beyond the limits of his particular field. So distinguished an authority as Max Müller recently gave expression to the opinion that deaf-mutes, left to themselves, would rise no higher than orang-outangs, although he immediately qualified this by declaring himself an agnostic as to the inner life of deaf-mutes. The statement is an illustration of how far a man confessedly great in one branch of study may go wrong when treating of questions outside of his specialty.

The first place in this scientific testimony is held by Professor Edward D. Cope, editor of the *American Naturalist*. We are assured by him that a deaf-mute variety is possible. In proof of this assurance, we are informed that "the evolution of a deaf-mute variety is not more improbable than that blind species of animals should arise and be perpetuated,—a circumstance which has often occurred in the evolution of animals." Then, treating of the origin of such animals, he tells us that "disuse is the cause of blind species." He gives us a list of batrachians which are deaf, and whose deafness is ascribed to what he calls "disuse." But what possible analogy is there between the blind fishes of Mammoth Cave, whose conditions of life preclude the necessity of sight; between the batrachians living in subterranean and aquatic depths, where sounds do not enter,—and those beings living in a world where light and sound are the things most palpable to the senses? Species whose development

has been in perfect harmony with their environment are here compared to a few individuals differentiated from their kind by some abnormal variation, the abnormal factor in the case rarely of a fixed character. If the editor of the *Naturalist* can find among his blind species individuals possessing sight, or, in the depths of which he speaks, batrachians with the power of hearing, he will then present us a parallel case with deaf people in a hearing world. To affirm the possibility of a deaf race in a world of sound by the existence of blind and deaf species where there is neither light nor sound, is not the sort of evidence that our men of science are wont to rest upon in the verification of their theories.

The second witness, Professor Alpheus Hyatt, in presenting his evidence, begins with a cautious "if." He readily indorses the theory, on the ground, apparently, that all characteristics tend to become inherited. He nowhere defines what he means by a characteristic, and the question naturally arises whether he regards the ante-natal lesion of the auditory nerve or the rupture of the ear-drum as peculiarities to be transmitted. One may as well talk of a one-armed man transmitting his defect as to speak of many of those who are deaf transmitting theirs. This writer evidently does not realize that we are still in the dark as to what the physical causes of deafness are. Of adventitious deafness the causes are innumerable, but the whole field of ante-natal deafness has been comparatively neglected. Whether the few cases noted of apparently hereditary deafness are due to some malformation of the hearing-organs, or whether they are the result of a vitiated diathesis predisposing to deafness, is a question not yet decided. We have sufficient evidence, from the reports to the British House of Commons and from other sources, to prove that scrofula is directly responsible for a large proportion of the cases of deafness.

Dr. H. P. Bowditch, the third authority quoted in this scientific symposium, has very little to say, except to assure his correspondent that he is "perfectly right" in his theory, and, in closing, to compliment him on striking a note of "warning of the danger which attends the purely philanthropic method of dealing with social problems." Just what the author of this opinion means by his last remark, it would be interesting to know. But if we may be permitted to interpret this implied censure, it is that the philanthropy which has done so much for the education of the deaf; which has made it possible for them to own farms, to be editors, lawyers, and teachers, to be factory-men, shoemakers, and carpenters; which fits them, indeed, to exercise all the rights of men and of citizens,—is also in some way responsible for what these people do after leaving school. Philanthropy really finishes its work with the education of the deaf, and then leaves them where the students of other schools are left. But it so happens that these people are social beings, that they are endowed with all those instincts which lie at the basis of our common life; and they often marry among their kind, living in happiness and peace, finding in each other's society some compensation for the loneliness of their lot; and for this, too, that abstract thing philanthropy is held responsible. Those concerned in the education of the deaf are no more accountable for the matrimonial alliances of their pupils than the professors of a university are for the

marriages of the students who come under their tuition. The social problems, whether among the deaf or the hearing, are often grave enough, but surely not of a character to justify the covert charge to which this writer has given expression. The deaf married before special schools were organized, and they marry under the system which has the special advocacy of the author of "Facts and Opinions." Twenty per cent of the deaf between twenty and eighty years of age in Germany are married. That misfortunes of a special kind sometimes come upon the offspring of the deaf is not to be questioned. Every step forward in civilization develops some new evil. Education produces forgers and counterfeiters. Knowledge of chemistry has put into the hands of the criminal classes terrible forces of destruction. A long indictment against the arts and improvements of modern life could easily be made. Not one of them is an unmixed good. The dependent and delinquent classes in the last census numbered 400,000 persons. If we add to this the death-rate of all under five years of age, it will be seen that if people are to be deterred from marrying by the possible ills, moral and physical, which may fall upon their offspring, the race would soon become extinct.

The fourth authority in the testimony quoted, Professor William H. Brewer, is worthy of notice as giving the number of generations necessary to fix a new variety. "Five generations of sires and four of dams is a common rule." But in "Facts and Opinions" (p. 103) we find that a deaf-mute of the fifth generation marries a deaf woman, generation unknown, and the five children of this union all hear and speak. Another interesting fact which shows the difficulty of predicating heredity is given by a former principal of the Pennsylvania Institution for Deaf-Mutes: A deaf man from a family of five deaf children married a deaf woman from a family of three deaf children, and the seven children resulting from this marriage are free from the affliction of their parents. As long as facts of this character are to be found in great number, it is not to be wondered at that those who mingle freely among the deaf refuse to assent to the extreme statement of the case as found in "Facts and Opinions" and other published addresses. While Professor Brewer tries to prove the probability of the evolution of a deaf variety, he insists upon "fixity in the distinctive character,"—an indefinite phrase, which may mean a dozen things,—and admits that if deafness is not transmitted to the offspring as a rule, then the special points are but individual peculiarities. This admission is fatal to his theory, for the probability of transmitting a like anatomical defect is so remote as to remove the question to the domain of the doctrine of chances.

It is with considerable hesitation that one ventures to say any thing of the honored name which holds the next place in this symposium. Professor Simon Newcomb is a man of most varied learning and acquirements, a distinguished astronomer, an eminent physicist, a writer on political economy, an estimable man; and it is a matter of considerable surprise, that, with the resources of the Washington College within easy access, he has permitted himself to indorse the theory upon the *ex parte* statement of the case presented to him. It is true that the writer simply presents an hypothetical case; but there are hypotheses so reasonable as to carry in their statement every presumption of truth,

and there are hypotheses so violent as to be classed at once with the improbable. He also tries to fix the number of generations that must elapse before the deaf variety would be evolved. It is necessary to the success of the plan that congenitals marry congenitals, and the process must continue from generation to generation. The hearing children are to be eliminated from the community, and the successive unions must be between those among whom heredity is already a fixed factor. This statement of the case reminds us of Plato's ideal republic. It must consist of 11,080 persons, just as many women as men, and all additions to the number are to be banished. The nature of the facts upon which the opinion we are here considering is built may be seen from the following ("Facts and Opinions," p. 98, *Italics mine*): "According to the law of heredity, the *probability* [of a deaf-mute race] will increase with each successive generation. In the *absence of any exact knowledge* of this law, I shall *assume* that the *probability* of deaf-mute parents having deaf-mute children increases through successive generations according to the series $\frac{1}{5}, \frac{1}{3}, \frac{1}{2}, \frac{2}{3}, \frac{3}{4}, \frac{4}{5}$, etc."

But suppose the variety, along the selected lines, never reaches the one-fifth stage, or, reaching that, disappears in the next generation, what becomes of the formula? There is no evidence in this testimony of any knowledge of the disparity between males and females born deaf, and the discussion proceeds on the assumption that deafness is due to some one physical fact. If the formula has any approximation to truth, then the American Asylum at Hartford, after a history of more than two generations, ought to show some signs of it; but of the first hundred pupils admitted, beginning in the year 1817, forty-five were born deaf, while of the last one hundred, ending in 1889, forty-one were born deaf; so that after seventy years of deaf-mute education, with its enormous proportion of deaf-mute marriages and the asserted increasing percentage of deaf-born children, the proportion born deaf remains practically unchanged, the slight change which has occurred being a decrease. Our quarrel with this scientific testimony is that throughout the discussion thus far assumptions and probabilities have taken the place of facts, and types of development containing nothing irregular have been compared to an artificial process of fixing and propagating a defect.

It is with great pleasure that we turn from the previous testimonies to the few pages contributed by Professor W. K. Brooks, professor of morphology in Johns Hopkins University. Here we have a clear, concise, scientific exposition of the subject. He is the first of these scientific men to begin with a careful definition of what an inherited characteristic is, and the only one to note that a congenital peculiarity is not necessarily an inherited peculiarity. He divides the deaf into four classes: viz., 1. Accidental deafness after birth; 2. Loss of hearing by accident before birth; 3. Cases where there is an inherited predisposition to deafness; 4. Cases of inherited deafness.

The conditions for the evolution of a deaf-mute race, as set forth by Professor Brooks, are that those among the deaf who marry must have the same inherited peculiarity. From this statement of the case, I doubt whether any of those most familiar with the deaf would dissent. The only comment they would be likely to make would be that marriage among the deaf of those having the same inherited

peculiarity is as rare as marriage between people with red hair. Professor Brooks has also the candor to give us the opinion of Professor Galton, somewhat contradictory of the views set forth in his discussion. But there can be no question that the law of regression, as announced by Galton, will assert itself; and there will be a constant tendency, even among the children of parents having the same peculiarity, to revert to the normal type. The evolutionary process which produced hearing ought in time to repeat itself, and individuals in the variety would soon multiply, and the defect in time be eliminated. The reference of Professor Brooks and of all the writers to the experience of breeders is not quite pertinent, for in none of the cases referred to was the point to be transmitted a defect. Success in the progressive development of new species ought not to be cited to prove that the attempt would be equally successful in a process of deterioration. This much is evident, that, if a deaf-mute variety could ever be formed, it would only be after rigorous selection among those whose heredity had already become a fixed quantity, under the controlling purpose of making the experiment a success. That this will ever take place, the wildest pessimist of the future of the deaf will hardly venture to claim.

The above is part of the testimony presented by Professor Bell to the British House of Commons. It is also part of the indictment of our American system of instruction. It is well, however, to look abroad, and note a few facts in regard to those countries which are claimed to be so much in advance of ours. In Italy, the home of the pure oral method, more than 70 per cent of the deaf can neither read nor write ("Report to the British House of Commons"), while in the six New England States only 10.8 per cent are illiterate. We have, however, fuller statistics from Germany. Taking the thirteen German provinces, and comparing them with the same number of our States most populous in deaf-mutes, we have to each 100,000 inhabitants the following deaf-mute population:—

GERMAN PROVINCES.		UNITED STATES.	
	Number of Deaf-Mutes in 100,000 Inhabitants.		Number of Deaf-Mutes in 100,000 Inhabitants.
East Prussia.....	189	Indiana.....	91
West Prussia.....	182	Utah.....	84
Posen.....	154	West Virginia.....	84
Pomerania.....	127	Wisconsin.....	83
Hesse Nassau.....	101	New England.....	78
Brandenburg.....	97	Kentucky.....	78
Silesia.....	97	New York.....	75
Hohenzollern.....	92	North Carolina.....	74
Hanover.....	78	Missouri.....	74
Rhine Provinces.....	78	Ohio.....	72
Saxony.....	76	Maryland.....	72
Westphalia.....	74	Pennsylvania.....	72
Berlin.....	65	Tennessee.....	72

These figures prove with irresistible force that the number of deaf-mutes in a community is not due to the use of the sign-language, nor to the congregate system of housing pupils, for neither of these prevails in Germany.

When it is further remembered that this is a new country; that malignant types of such diseases as cerebro-spinal meningitis and scarlet-fever have swept through whole communities, in some cases more than doubling the percentage of our deaf-mute population; that the incoming of a large foreign population, with all the ills attending the

opening-up of new lands, has also helped to swell the number of the deaf,—there is certainly something to glory in, that we have still a much smaller percentage of deaf-mutes than the ideal countries we are invited to take as our models.

BUTTER AND OLEOMARGARINE.

THE wholesomeness of artificial butter has been affirmed by eminent chemists and physiologists, both in Europe and in this country, who have devoted attention to this subject, when it is prepared from carefully selected and sweet fat of healthy animals, and the process conducted in a proper and cleanly manner. (See in this connection the statements of Dr. C. F. Chandler of the School of Mines, Columbia College, New York; Professor Henry Morton, Stevens Institute, Hoboken, N.J.; Professor G. F. Barker, University of Pennsylvania, Philadelphia; Professor G. C. Caldwell, Cornell University, Ithaca, N.Y.; Professor S. W. Johnson, Sheffield Scientific School, Yale College, New Haven, Conn.; Dr. J. W. S. Arnold, University Physiological Laboratory, New York, submitted to the Senate Committee on Agriculture and Forestry; and by Sir F. A. Abel, Mr. Herbert P. Thomas, Mr. A. H. Allen, president of the Society of Public Analysts; Mr. Otto Hehner, secretary of the Society of Public Analysts; Dr. James Bell, principal analyzer to the Commissioners of Inland Revenue, and others before the English Select Committee.)

Mr. Herbert P. Thomas, principal clerk of the Local Government Board in charge of the Public Health Department, stated in his testimony before the Select Committee¹ that they had no evidence that butterine was injurious to health. "It is a very curious thing that our inspectors have connected epidemics with a very large number of substances; for instance, epidemics have been supposed to be connected with milk, with cream, with hams, and with cheese, but not with butter or butterine."

The most scrupulous cleanliness should be observed in the manufacture of oleomargarine. Even a small amount of fat, if allowed to adhere to the apparatus and utensils used, is liable to decompose in such a way as to spoil the succeeding batch of materials worked up. Fats can undoubtedly be deodorized by means of chemicals, but it is very questionable whether they could be used as butter substitutes, owing to the increased expense involved to make them perfectly tasteless, as it is very hard to get rid of the tainted taste.

That there is a remote possibility, especially when the cattle and hogs are not inspected by a competent veterinarian before slaughtering, of the fats used containing parasitic organisms may be granted, but the remedy is self-evident. The chance of disease being conveyed in this way is very small, but not yet proved to be non-existent.

Against oleomargarine there has been a large amount of legislation directed, with a view of controlling its production and sale, and with the unexpected result of increasing both.

Whatever may have been the production of oleomargarine in this country before the national law went into effect, we have no reliable statistics; but since the 1st of November,

1886, we have the monthly statements of the manufacturers, duly attested under oath, of the quantity of oleomargarine made and removed from the factories, tax paid for domestic consumption, or in bond for export, each day of the month. These statements also give the quantity and kind of materials employed in the manufacture, and the name and addresses of the parties to whom the oleomargarine is sold or consigned.

Table IV shows the quantity of oleomargarine produced in this country from Nov. 1, 1886, to Nov. 1, 1889.

Table IV.—Showing the Quantity of Oleomargarine produced, withdrawn Tax paid, for Export, and Lost or Destroyed in Manufactories, from Nov. 1, 1886, to Nov. 1, 1889.

Year.	Quantity Produced. Pounds.	Withdrawn Tax paid. Pounds.	Lost or Destroyed. Pounds.	Withdrawn for Export. Pounds.
On hand Nov. 1, 1886...	181,090			
From Nov. 1, 1886, to Oct. 31, 1887.....	31,114,682	29,692,966	55,260	1,029,880
Highest, March, 1887.	3,568,254	3,512,138	12,472	96,499
Lowest, July, 1887....	1,208,638	1,170,136	1,191	33,240
From Nov. 1, 1887, to Oct. 31, 1888.....	35,530,146	33,655,423	6,442	1,937,907
Highest, March, 1888.	3,940,727	3,824,672	2,998	155,761
Lowest, July, 1888....	2,084,317	1,925,762	185	155,200
From Nov. 1, 1888, to Oct. 31, 1889.....	35,132,060	32,902,802	6,741	1,694,851
Highest, Dec., 1888...	4,181,317	4,025,336	10	109,385
Lowest, June, 1889....	1,575,362	1,514,658	—	58,579
On hand Oct. 31, 1889...	429,219			
Total for 3 years..	101,786,888	96,251,191	68,443	4,662,638

These figures are interesting because oleomargarine is the only food substitute about whose production and sale we have positive knowledge.

During this period the number of factories decreased from 37 to 21, notwithstanding which fact the production and sale increased steadily. Oleomargarine is produced by expensive machinery in the large factories in such quantities that it can be sold nearly the whole year round at a less price than butter, although the high rate of tax paid by both the manufacturers and dealers, which is, of course, ultimately paid by the consumer, necessarily increases the market price. In the spring and early summer months dairy butter is generally cheaper than oleomargarine, and consequently less of the latter is made and sold during that time. In July the production of oleomargarine reaches its lowest limits for the year, and obtains its highest in March.

The system followed by the Internal Revenue Bureau is such that each manufacturer's package can be traced from the time it leaves the factory till it reaches the hands of the retailer or consumer, or leaves the country.

The high rate of tax demanded from the manufacturers and dealers was undoubtedly intended to be nearly or quite prohibitory; when compared with those paid by other special tax-payers, rectifiers, brewers, etc., as shown in Table V, the amounts are from three to ten times as high.

¹ P. 9, Special Report from the Select Committee on the Butter Substitutes Bill, ordered by the House of Commons to be printed, July 4, 1887.

Table V.—Rate of Special Taxes per Annum.

	Oleomargarine.	Liquors.		Tobacco Manufactured.
		Distilled.	Malt.	
Manufacturer.....	\$600 00	\$200 00 ¹	\$100 00 ²	\$6 00
Wholesale dealer.....	480 00	100 00	50 00	30 00 ³
Retail dealer.....	48 00	25 00	20 00	2 40

¹ Rectifier of 500 barrels, or more, per annum.² Annual manufacture, 500 barrels or more.³ Pedler of tobacco, first-class.

It is undoubtedly a fact that if the retailer's tax were as low as that for tobacco, the manufacturers of oleomargarine would pay the same to have at least one dealer to handle their goods in every village and town in this country. As it is, in the Chicago district, where there are seven factories, there were 974 retail dealers doing business in April, 1889, compared with 726 the April previous; in the Boston district, with its one factory, there were 460 retailers in April, 1889, and 405 at the corresponding time in 1888; in the Connecticut district, with four factories, there were 424 in 1889, and 384 the year previous; and in Michigan, with no factory, there were 290 and 267 respectively for the same periods. These four collection districts contain over one-half of the total number of retail dealers doing business at the close of the special tax year ending April 30, 1889. This would seem to indicate that where the public has been brought in unprejudiced contact with oleomargarine, as sold on its own merits, they have found it palatable and suitable to their wants.

I have been in retail stores in the lumber and mining regions of the upper peninsula of Michigan, in Boston, Chicago, and elsewhere, where as much as one-half to one ton of oleomargarine is sold per week, in quantities of less than ten pounds to any one purchaser at one time, put up in packages duly branded with the word "Oleomargarine," as required by the law and regulations.

From a personal inspection of some of the largest factories, I am convinced that the greatest cleanliness is observed throughout all the operations; that nothing but the freshest animal fats are used; that machinery is employed as much as possible, and large quantities worked at a time, to reduce the expense. The factories are as well arranged as the best creameries; and it is to the manufacturer's interest to produce a palatable and wholesome product, which is, however, not intended to compete with "gilt-edge" butter.

In April and May, 1888, with the aid of the local Internal Revenue officers, I made an inspection of the material sold for butter in several of the large cities. Over eleven thousand samples were collected, and it must be said that about ten per cent of these were unfit for human consumption, being exceedingly rancid, and in many cases actually putrid; nevertheless they were genuine butters, and not mixtures containing foreign fats. In our large Eastern cities there are dealers in low-grade butters who put on the market what is known as "ladle-packed" or "hash" butter, a compound of the remnant stock of country dealers worked up "with additional coloring matter," to please the eye and make the mass uniform. It is about as savory a grease as "prime steam lard." One effect of the oleomargarine law has been

that dealers in "hash" butter have to sell it on its own merits, and not call it oleomargarine for an excuse, when their customers complained of its rancid taste, as they did before the law was passed.

A few years ago the dairy commissioner of one of our large States considered it necessary to issue a circular to butter makers, especially to those having one or two cows, embodying certain directions in regard to handling milk and butter, which implies such want of common cleanliness in these manipulations by the ordinary butter makers, that I cannot refrain from quoting from it:—

"Third.—Be clean and decent about your milking. Never wet the teat with milk and let the drip from your dirty hands drop into the pail to spoil the flavor of the milk. Remove the milk from the stable or all impure odors as soon as possible. Use no milk pails or milk vessels of any kind made of wood, but have all made of tin, and never use them except they are scalded with very hot water and made perfectly sweet and clean.

"Fourth.— . . . Have loose covers on the cans to prevent flies, bugs, and millers getting into the cream, and put this whole business [the cans] in some room or place where all the foul odors of a kitchen or pantry can not spoil its flavor.

"Sixth.—When you strain the milk into cans, have your cloth milk-strainer folded from four to six thicknesses, so that all manner of filth that ever gets into it will be taken out. Scald the cloth then thoroughly. Never use an old sour strainer for this work. . . . Have a thermometer to test this [the temperature of the cream], and not stick your finger in to tell by."

I am afraid that the butter makers of this State are not the only ones guilty of such practices.

Where butter is made in small quantities at a time and "salted down" between churnings, and some time elapses before the tub is filled, the lower layers have probably commenced to ferment, and before long the whole lot is rancid.

When care is taken, as in large creameries, the butter maker never experiences the least trouble in selling his product the year round at a remunerative price, and it is only the careless man, who makes an inferior article, that experiences this difficulty.

The adulteration of butter with water and salt is as much a fraud on the public as the addition of foreign fats, coloring matter, or any other form of deception. Water and salt are expensive luxuries when one has to pay at the rate of twenty-five to forty cents a pound for them, yet that is what happens if a purchaser buys four pounds of a butter containing twenty per cent of water and five per cent of salt—not an uncommon case.

There is a special provision in the law in regard to the use of any unwholesome material or product in the manufacture of oleomargarine, but no sample has ever been submitted to the Commissioner of Internal Revenue under it.

Owing to the construction by the Attorney-General of Section 2 of the oleomargarine law, the internal revenue officers exercise no control over the production and sale of oleo oil, although the Commissioner has recommended that Congress amend the law in that regard. From inquiries that were made in June, 1888, by the collectors of internal revenue, there was found to have been produced during

the year ended June 30, 1888, 69,623,795 pounds of oleo oil in nine States. There were used in the manufacture of oleo-margarine, as stated in the manufacturers' returns, 12,265,800 pounds during that period, and 30,146,595 pounds were exported, leaving 27,211,400 pounds used otherwise. As oleo oil is sold at a much higher rate than tallow, it is presumable that this large quantity is used in some other food products, as emulsified cream and cheeses.

EDGAR RICHARDS.

NOTES AND NEWS.

It is proposed to construct a railroad tunnel under the Narrows in New York harbor, to connect Long Island with Staten Island. A company has been incorporated to build the railroads connecting with the tunnel, and part of the route has been surveyed. The total length of the tunnel will be less than two miles, a great part of the way through easily worked stone.

—The first convention of the North American Association for the Propagation of Volapük will be held in Boston, Aug. 21, 22, and 23. According to Article IV. of the Constitution, "Any Volapükist may become a member by sending one dollar to the Lepenädan," Mr. C. C. Beale, No. 180 Washington Street, Boston, Mass. This entitles to the grade of membership called kopanel or associate member. "Upon proof of proficiency a kopanel becomes a kopanal or active member. Only the latter may vote or hold office."

—The thirty-ninth meeting of the American Association for the Advancement of Science will be held at Indianapolis, Ind., beginning on Aug. 19. Members desiring to attend are expected to pay full fare at the point of starting, and should have the ticket agent furnish a certificate which will entitle the holder, upon being indorsed by the secretary of the association, to a return ticket at one-third of the regular fare. The railroads of the country are divided into different passenger associations, and if the member's route covers more than the territory covered by one such association, a separate certificate must be taken covering each association's territory traversed. The railroad companies have established the following rule: "No refund of fare will be made on any account whatever because of the failure of the parties to obtain certificates." The local secretary, or assistant, will be in attendance at a temporary office in the Union Station, or immediately opposite, during the first two days of the meeting, while members are arriving, to furnish any special information which may be desired. The place of meeting is in the new Capitol Building, where rooms will be furnished for all the officers, sections, and committees under one roof. The post-office authorities have kindly arranged for a branch office at the Capitol, so that all mail matter will reach its proper destination if addressed, "Care of A. A. A. S." A room will be provided for storage of apparatus and specimens sent by express, and all packages may be addressed "in care of the local secretary." The council will meet at the Denison Hotel parlors at noon on Tuesday, Aug. 19. The opening general session will be on Wednesday morning at the Capitol Building, when President Mendenhall will resign the chair to his successor, Professor Goodale. On Wednesday evening the retiring president will give his address in Plymouth Church. This will be followed by a reception of the association by the local committee and citizens at the Institute for the Blind. With the exception of Saturday and Sunday, the sections will hold morning and afternoon sessions until Tuesday evening, when the general closing session takes place. On Monday afternoon a special train will take the botanists to South Waveland. The Science Club, of Terre Haute, has invited Sections B, C, and D to hold their session at Terre Haute on Friday, where a visit will be made to the Rose Polytechnic Institute. The citizens of Lafayette have extended an invitation to Section F to visit Lafayette. The above invitations from Terre Haute and Lafayette will be accepted if approved by the council. On Wednesday a special excursion will be run to the Mammoth Cave. On Saturday an ex-

tensive trip will visit the gas territory of Indiana, and a visit will be made to the largest plate glass factory in the United States, and other concerns where natural gas is applied to manufacturing uses. For all matters pertaining to membership, papers, and business of the association, address the permanent secretary, Professor F. W. Putnam, until Aug. 15, Salem, Mass.; after Aug. 15 at the Denison Hotel, Indianapolis, Ind.

—A steam life-boat which recently made her trial trip in England is described by the London journals as being built of steel, with fifteen water tight compartments. The boiler and engine rooms are brought up about three feet above the main deck, and are closed by iron covers to the man-holes, air being supplied by forced draught. The passengers' space is abaft the engines, seated all round, and will hold about thirty persons. The mode of propulsion adopted is a turbine, taking in water through the bottom of the boat at its apex, and discharging the water when it has attained its maximum velocity through tubular orifices on each side. About one ton of water per second is discharged. The speed at which the vessel ran on her trial trip was over eight knots. From full speed ahead the vessel can be stopped in thirty-two seconds, and way can be got on her again in four seconds. She carries a mast with some sail power forward, the mast being lowered when needful. The new life-boat is stationed at Harwich.

—If we follow the march of the vicissitudes of temperature, evidently determined by some cosmical agency, says *Nature*, we find at the beginning of Tertiary times a moderately warm climate; then a rise during the Eocene, and then a gradual cooling, interrupted possibly by some oscillations, down to a degree nearly corresponding to that now prevailing, at the beginning of the Pleistocene epoch. Then the cooling continued below the present temperature, to a minimum at the time of the greatest glaciation of the land; then a re-warming in the inter-glacial period nearly up to the present temperature; after which cold and glaciation regained the upper hand, finally to give way to the present conditions, which are about midway between the greatest warmth of the Tertiary age and the greatest cold of the Pleistocene. One fact stands out conspicuously, viz., that these changes progressed very irregularly, and were subject to much oscillation, and the period during which we can approximately follow the course of the change is much too short to enable us to learn the law that regulated it. We can not decide whether oscillations like those of the Pleistocene will be repeated, and we are now progressing towards another temporary Glacial period, or whether we have to expect the return to a warmer temperature such as prevailed in Tertiary times, or, finally, whether the outcome of all the deviations will be a lasting refrigeration of our climate. Just as little can we determine at present by what agency all these vicissitudes are brought about; most plausible and simple would it certainly be were the sun a variable star that at different periods emits different quantities of heat; but for this or any other assumption there is no proof forthcoming. This enigma, like so many others, will some day be solved by man's searching intelligence, but, like all other acquisitions of science, this goal can be won only by assiduous and patient labor. Haply the triumph may not be for our generation; but what we may certainly accomplish is to prepare the way to it, by an accurate and critical collection of the facts.

—In no other Scandinavian country is school education a State affair to the same degree as in Sweden, says a correspondent of the *London Journal of Education*. Not only are the higher secondary schools public, as in Norway and Denmark, but all primary schools are subject to public regulations and controlled by public functionaries, and the elementary teachers are appointed by the authorities. Likewise, the intermediate schools are nearly always public institutions, whose masters are civil servants, with all the duties and privileges resulting therefrom. In Norway, intermediate school education is in most places municipal, with State subvention, although the towns which have public secondary schools also have public intermediate schools; while in Denmark the intermediate schools are always municipal or private. The result of the Swedish system is that their schools are excellent, as the public appointment and the independent position of almost all the teachers greatly contribute to attract talented young

collegemen to a scholastic career. As in Denmark and Norway, no teacher can be appointed in primary schools, or to the lower classes of intermediate schools, who has not studied at a training college. In the higher classes of intermediate schools and in the secondary schools nobody can be appointed who has not passed the so called teacher's examination at the University. To pass this examination necessitates, in all the Scandinavian countries, a course of studies of five to six years at the University. All the teachers appointed have, accordingly, all the scientific requirements for a good teacher. Another salutary result of the system is that the school education is not expensive, being almost gratuitous, which has the effect of opening a career for all in the civil and clerical service. On the other hand, this nearly free education has, as a matter of course, given rise to a large conflux of office-seekers and place-hunters, and has, on the whole, made the struggle for life not any easier among the professional classes.

—It is stated by the *Engineering and Mining Journal* that the project for making Paris into a port is now completed, and nothing remains but the sanction of the Government to put the works into the hands of the contractors. Hitherto the Government has kept aloof from the proposals until its promoters were in a position to carry out the undertaking to a successful issue, a caution engendered by the recent failures of French engineering undertakings. The promoters have now raised the necessary capital, amounting to £5,400,000, and it is probable that the sanction of the government will be given to the project, and the work of canalizing the Seine with a view to allowing the passage of sea-going vessels from Havre to Paris will be proceeded with, and extensive docks will be constructed at Pantin, on the north-east of the city. Another proposal is for the construction of a canal to connect the Mediterranean with the Bay of Biscay, with the intention of intercepting a great part of the shipping which at present passes through the Straits of Gibraltar. If these two projects be carried out, they will have an immense effect on the trade of France.

—An East India newspaper, quoted by *Nature*, reports the result of a recent expedition to investigate the upper course of the Irawadi, the source of which, as is well known, is one of the still unsolved problems of geography. It has long been known from native report that two rivers, the Mali Kha and the Meh Kha, the former from the north, the latter from the east, unite a little below 26° north latitude to form the Irawadi. The sources of the Mali Kha are known to be in the mountains to the east of the Brahmakund, which form the south-eastern water-parting of the Lohit Brahmaputra; but the Meh Kha, which is stated to be the larger stream, and which Colonel Walker supposes to be identical with the Lu River of Tibet, has never before been seen by any European. The junction of these two rivers has now for the first time been reached by an expeditionary party ascending from Bhamo. On May 27, Captain Barwick, of the Indian marine, accompanied by Mr. Shaw, the Deputy Commissioner of Bhamo, and Major Fenton, of the Intelligence Department, left Bhamo in the "Pathfinder," a paddle-steamer of about thirty-five tons, with a view to reaching the point of confluence. From Bhamo as far as Maingna the stream is well known. Above Maingna the river runs between mountains from one thousand two hundred to two thousand feet high, and a succession of rapids has to be passed through, which by dint of hard struggling and after many attempts the "Pathfinder" successfully ascended, not, however, without several hairbreadth escapes from foundering, the whirlpools simply taking charge of the vessel. After six days' steaming, the party reached the confluence of the streams, distant about one hundred and fifty miles from Bhamo. Here the river was found to be five hundred yards wide, one branch, the Mali Kha, trending to the north-eastward, the other, the Nmaika (Meh Kha of the map), to the eastward. Up the former the explorers proceeded some six miles, and then came upon a series of rapids. It was decided not to go further, as the small quantity of fuel remaining was reserved for steaming up the other branch. A halt of a day was made, and the position fixed in 25° 56' north latitude, and 97° 38' east longitude. Returning to the confluence, Captain Barwick proceeded three miles up the Nmaika, when a rapid prevented fur-

ther progress. The Kachins are said to have been very friendly, though they had never seen or been in communication with Europeans before.

—In the second part of the first volume of the Transactions of the Royal Society of Victoria Mr. A. W. Howitt, in a well-arranged and instructive paper, deals with the organization of Australian tribes. The following are among Mr. Howitt's conclusions, as given in *Nature*:—(1) The group is the sole unit. The individual is subordinate in the more primitive form of society, but becomes more and more predominant in the advancing social stages. Thus group marriage becomes at length completely subordinate to individual marriage, or even practically extinct and forgotten where descent has been changed from the female to the male line. (2) An Australian tribe is not a number of individuals associated together by reason of relationship and propinquity merely. It is an organized society governed by strict customary laws, which are administered by the elder men, who in very many, if not in all, tribes exercise their inherited authority after secret consultation. (3) There are probably in all tribes men who are recognized as the headmen of class divisions, totems, or of local divisions, and to whom more or less of obedience is freely given. There are more than traces of the inheritance by sons (own or tribal) of the authority of these headmen, and there is thus more than a mere foreshadowing of a chieftainship of the tribe in a hereditary form. (4) Relationship is of group to group, and the individual takes the relationship of his group, and shares with it the collective and individual rights and liabilities. The general result arrived at is that the Australian savages have a social organization which has been developed from a state when two groups of people were living together with almost all things in common, and when within the group there was a regulated sexual promiscuity. The existence of two exogamous intermarrying groups seems to Mr. Howitt to almost require the previous existence of an undivided commune from the segmentation of which they arose.

—In his monthly report for July, Arthur Winslow, State Geologist of Missouri, states that the work of detailed mapping in the coal fields has progressed without interruption, one hundred and ten square miles being covered in the field during the month. A portion of the results of this work has been reduced and transferred to the final sheets, two of which will soon be in a condition for engraving. Detailed work has been started in Randolph County, and Professor C. H. Gordon, of Keokuk, Iowa, a volunteer assistant for the summer, has been assigned to this work. On July 7 detailed work was started in Greene County under Professor E. M. Shepard of Springfield, local assistant on the Survey; with him is Maj. E. W. Newton of Bolivar, also a local assistant. Over fifty square miles have been covered in that county. The detailed mapping of the crystalline rocks in south-east Missouri has also progressed uninterruptedly, and about seventy square miles have been covered. Field-work on the clays and building stones of St. Louis has been completed, and the report on the results is in course of preparation. In the Laboratory the report on the mineral waters of Henry, St. Clair, Benton, and Johnson Counties has been written and is ready for publication. It will be issued in the next Bulletin. Further analyses of thirty limestones have been made, some nine miscellaneous specimens have been determined or analyzed for the Survey, and sixteen lots of specimens from outside parties have been examined and reported upon. Preliminary inspections have been made in Clarke, Scotland, Randolph, Monroe, Marion, and Franklin Counties, with the object of determining the character and amount of work which will be necessary in the future in the sections which they represent. In the office, a large amount of time has been spent in labelling and filing away for future reference and study the already bulky collection of the Survey, which now includes over one thousand three hundred specimens. A large number of valuable illustrative specimens have been collected during the past month, in addition to these, and will soon be shipped to the office. Some progress has been made in the arrangement of specimens in the cabinet, for exhibition, a few of which are now classified and labelled. Paleontologic work has been in progress in Henry and St. Clair Counties.

SCIENCE:

A WEEKLY NEWSPAPER OF ALL THE ARTS AND SCIENCES.

PUBLISHED BY

N. D. C. HODGES,

47 LAFAYETTE PLACE, NEW YORK.

SUBSCRIPTIONS.—United States and Canada..... \$3.50 a year.

Great Britain and Europe..... 4.50 a year.

Communications will be welcomed from any quarter. Abstracts of scientific papers are solicited, and twenty copies of the issue containing such will be mailed the author on request in advance. Rejected manuscripts will be returned to the authors only when the requisite amount of postage accompanies the manuscript. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guaranty of good faith. We do not hold ourselves responsible for any view or opinions expressed in the communications of our correspondents.

Attention is called to the "Wants" column. All are invited to use it in soliciting information or seeking new positions. The name and address of applicants should be given in full, so that answers will go direct to them. The "Exchange" column is likewise open.

VOL. XVI. NEW YORK, AUGUST 15, 1890. No. 393.

CONTENTS:

THE SCIENTIFIC TESTIMONY OF "FACTS AND OPINIONS".....	International Congress on Alcohol.....	93
W. G. Jenkins 85	LETTERS TO THE EDITOR.	
BUTTER AND OLEOMARGARINE.....	The Eskimo of Cape Prince of Wales, Hudson's Strait.....	93
Edgar Richards 88	F. F. Payne 93	
NOTES AND NEWS.....	MOVEMENT OF THE HIGHER ATMOSPHERE. H. A. Hazen.....	94
SLATE PRODUCTS.....	BOOK-REVIEWS.	
HEALTH MATTERS.	The Ethical Problem.....	95
The Wearing away of Teeth.....	AMONG THE PUBLISHERS.....	95
The Deficient Water Supply in Paris.....		

SLATE PRODUCTS.

RECOGNIZING the value of prompt publication of statistics, a report from the Division of Mines and Mining, under the charge of Dr. David T. Day, of the United States Geological Survey, is issued as a bulletin by the Census Office. It shows the product of slate during the calendar year 1889, as prepared by Dr. William C. Day, special agent in charge of stone. The bulletin shows also the value of slate, the number of men employed, the wages, and other expenses, and the capital involved in this industry. This statement is exact for the entire country, but is only a brief summary of the more important facts, which will be published in detail in the complete report. The investigation was principally pioneer work. When it was begun, eight months ago, there was not even a good list of the producers of slate, and no investigation so complete as even the brief results here presented had ever been successfully prosecuted. The total value of all slate produced in the United States in 1889 is \$3,444,863. Of this amount, \$2,775,271 is the value of 828,990 squares of roofing slate, and \$669,592 is the value of slate for all other purposes besides roofing. As compared with the statement of the Tenth Census report of 1880 on stone, the roofing-slate product of 1889 is nearly twice as great in number of squares and in value. A consideration of the slate used for purposes other than roofing appears to have been omitted from the Tenth Census report. The total value of all slate produced in 1889 is more than twice as great as that considered in the Tenth Census. According to "Mineral Resources of the United States, 1888," the total number of squares of roofing slate produced in

that year is 662,400, valued at \$2,053,440. Twelve states at present produce slate. A line drawn on the map from Piscataquis County, Me., to Polk County, Ga., and approximately following the coast outline, passes through all the important slate-producing localities. According to amount and value of product, the most important States are, in the order named, Pennsylvania, Vermont, Maine, New York, Maryland, and Virginia. In Georgia, Michigan, New Jersey, Arkansas, California, and Utah productive operations are of limited extent, and in the case of the latter three States, of very recent date. Inasmuch as in slate quarrying the initial operations are those of stripping and excavating, preliminary to actual output, some time must necessarily elapse before any returns for labor can be realized. For this reason the expenses incurred in Arkansas, California, and Utah exceed markedly the value of the output in those States. The twelve States referred to do not include all those in which merchantable slate is known to exist, since discoveries promising good results for the future have been made in a number of other States, among which may be especially mentioned Tennessee, where operations of production are beginning. The slate quarrymen of the country, and to a considerable extent the firms operating the quarries, are either Welsh or of Welsh descent, many of them having learned the methods of quarrying slate in the celebrated quarries of Wales. The quarries are operated on an average of about 230 days in the year. The idle days are the result of rainy weather and holidays. The first day of every month is regarded as a holiday by the Welsh quarrymen, and no work is ever done by them on Saturday afternoons.

HEALTH MATTERS.

The Wearing away of Teeth.

MR. MACLEOD, at a meeting of the Odonto-Chirurgical Society, said, according to the *Lancet*, that, having his attention drawn by a single case, he had been led to examine the teeth of various bag-pipers, and all of them represented wearing away of the cutting edges of the six front teeth, in a greater or lesser degree, varying with the density of the tooth structure and the time engaged in pipe playing. He found on inquiry that, on the average, it took about four years to make a well-marked impression, but that once the enamel edge was worn through the wearing away was more rapid. Every one was aware of the way in which the tobacco-pipe wore the teeth of the smoker, but this was not to be wondered at, the baked pipe-clay being a hard and gritty substance, but that a horn mouth-piece should have such appreciable effect was, he thought, a matter of curious interest. He mentioned, however, that the mouth-pieces suffered more than the teeth, the average life of a horn mouth-piece being twelve to eighteen months, that of a bone or ivory one being about two years. The peculiarity noticed was a crescent shaped aperture on the cutting edge of the front teeth in three localities, namely, between the central incisors and between the lateral and canine on both sides.

The Deficient Water-Supply of Paris.

It is a matter of surprise, says *The Lancet*, to all visitors of this gay city that the French, who assume to be in most things in the van of all other nations, should be so very backward in their water and sanitary arrangements in general. Each year as the summer returns a notice is published by the Municipal Council of Paris to the effect that owing to a scarcity of drinking water this latter will have to be temporarily replaced by water from the Seine. Although only temporarily, the Municipal Council seem to forget that one single draught of this water may be sufficient to cause death, as it is now generally admitted that river water is the vehicle of the germs of typhoid-fever, cholera, and of many other epidemic maladies. This arrangement does not extend to all Paris at the same time, but three are four arrondissements in succession are submitted to it for a term of twenty days. The excuse for this lamentable state of things is that the public coffers will not admit of the outlay necessitated by the arrangements for bringing spring water into the city, and yet millions are spent on less necessary purposes. It is all very well to open boulevards and squares, and to plant trees in all directions, but water is as indis-

pensable as air. M. Ferdinand Duval, late Prefect of the Seine, in writing on the subject made the remark that water should not only be in sufficient quantity but in abundance, and a city in which the inhabitants have only a very limited supply of water at their disposal he compared to a ship in distress. It appears that the senate has just voted the bill for supplying Paris with drinking-water from the Vigne Springs in the Avre Valley. It will be four years, however before Paris feels the benefit of this decision, as the works cannot be completed before that period.

International Congress on Alcohol.

The International Congress on Alcohol will hold its sittings in Christiania, Norway, on Sept. 3, 4, and 5; and the programme, as given in *The Lancet*, gives promise of highly interesting and, we trust, fruitful discussions. The report of the president of the permanent committee (Dr. Forel, of Zürich) will review the work achieved in lessening the evils of drunkenness between 1887 and 1890, after which papers will be read as follows: "The Means which have Proved most Effective in Norway for the Diminution of Alcoholism;" "The Results of the Gothenburg System;" "The Alcoholic Question in Relation to the Rearing of the Young;" "The Degeneration of Indigenous Tribes through the Spirit Trade;" and "Freely Diluted Alcoholic Beverages, or, in other words, Moderation as a Means of Combatting Intemperance." Other papers on branches of the drink question will be read by Dr. B. W. Richardson, Professor Böhmert, Dr. H. Von Hebra, Dr. H. Kurella, and other distinguished promoters of the temperance cause. Many non-medical or lay friends of the same social reform will take part in the proceedings, the attractiveness of which will be materially enhanced by an exhibition of writings, illustrations, and various other objects bearing directly or remotely on alcoholism in all its ramifications. A similar exhibition was held at the last meeting of the Congress (at Zürich), and proved an excellent adjunct to the discussions.

LETTERS TO THE EDITOR.

**.* Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.*

The editor will be glad to publish any queries consonant with the character of the journal.

On request, twenty copies of the number containing his communication will be furnished free to any correspondent.

The Eskimo of Cape Prince of Wales, Hudson's Strait.

(THE substance of this letter was read at the last meeting of the American Association for the Advancement of Science.)

One of the chief troubles to contend with in making notes upon the customs of the Eskimo is their extreme sensitiveness to ridicule, and it is therefore most necessary that you should put on your gravest expression when questioning them. Sometimes this sensitiveness is very interesting to watch. Upon one occasion, when employing my favorite Eskimo, Ugaluk, as an assistant in my boat, and telling him to throw out the anchor, he immediately picked it up and carrying it to the bow was in the act of casting it overboard without a rope attached to it. We were just in time to stop him, and naturally laughed, rather immoderately, at which he sat down in the boat and covering his face with his hands remained in that position for a long time, and was too shy to speak to us.

If offended at any time with their own people, or either of my men, they would immediately leave, and, without saying a word, would go home, and for some time they were not to be seen. We sometimes regretted that they could not be offended oftener, for most of them required continual watching when anything movable was about.

One afternoon several men entered our house, and, standing near the fire, refused most positively to go out. Knowing that promptness of action has a good effect upon them, one of them was immediately handled rather roughly, and stumbling, fell as he was bundled out of the door, the others following suit. For a minute we thought there was going to be trouble; the next moment, however, they picked themselves up, and, all turning with smiling faces, said "*Chimo, chimo*," which means "We are

friends." I may add that orders to leave our house after this were never disobeyed.

While, as a rule, the Eskimo looks upon the white man as born to do him favors, those met with would sometimes offer payment for our services; and for the burial of an aged relative, who died when his friends were away hunting, one of my men received the valuable gift of about two gallons of blubber, which of course he accepted with many thanks. Nevertheless, if an Eskimo was given an unusually valuable present, he would immediately turn round and ask for the most impossible things, as though he thought you were now in a good humor, and now was the time to get all he could from you.

As far as could be seen, it seemed to be the general belief that all property, especially in the way of food, belonged to everybody in common, and therefore, if you held more than another, it was only because you or your family were physically strong enough to protect it. Few men, of course, would steal from one another when food was plentiful, thereby making enemies for themselves, but, when food is scarce, might is right, and all make note of the position of their neighbors' caches before the winter's snow covers them.

At one time, after a raid had been made upon my storehouse by some rather desperate Eskimo, my trusted friend Ugaluk informed me that his wife had gone to get a share of the plunder. At first we were inclined to harangue him for infidelity, but soon saw he had not the slightest idea it was wrong to receive stolen property. Upon another occasion, under similar circumstances, I induced Ugaluk to help me track the robbers, and, with some trouble, we traced them to a deep gorge, where all we could see was a large hole in the snow. This was the doorway of an igloo ten feet below the surface, which had been covered by continuous drifting of the snow. Into this hole Ugaluk dived, while I remained outside. He soon returned and asked me to follow, which I did upon my knees for some distance, until I found myself in a very dirty dimly-lighted room. Sitting near the lamp was a woman, and by her were three children, these being the only occupants of the place. The woman denied most emphatically any knowledge of the theft, and was not moved in the least when informed that her husband would stand a chance of being shot if he took part in another burglary. Feeling that perhaps after all we were mistaken, we were just leaving, when the woman called us back, and, holding up a small piece of salt beef, said this was all her husband had taken, as unconcerned as though she had never denied it, and as though he had found it outside our door instead of having done a great deal of damage in securing it.

The Eskimo, of all races, are the most free, and in no case do they consider a man their superior unless he or his family are physically stronger or are better hunters than others. These superior men are treated with little deference, though they are usually sought for in the settlement of disputes, and sometimes act as public executioners. Ugaluk, who had all these qualities, was usually obeyed when an order was given by him, and we were much interested with his story of a comparatively recent execution which he undertook for the good of the community. Walking up to the offender, he held him in conversation for a few minutes, when suddenly, drawing a knife from his sleeve, he plunged it into his breast, and then finished him upon the ground, afterwards carrying his body out upon his kyak and dropping it into the sea. As Ugaluk related his story, in a whisper, he trembled violently, and it was quite evident he was haunted with certain fears.

As in civilized communities, there were several restless individuals living among those we met, who at different times had dwelt in many parts of the coast, one of whom at least had lived far up Fox Channel. These individuals are employed as traders, and evidently are the means of keeping the language intact.

As is well known, work is pretty well divided among these people, the men doing all the hunting and making and repairing implements, while the women take part in everything else, even in the making of boats and building houses, though the more laborious part of this work is performed by the men. When moving to a distant part of the coast, a small pack is put upon each dog, and the men and women divide equally the heavy goods to

be carried. When the snow is soft, the dogs are shod with seal-skin shoes.

The Eskimo's powers of endurance are wonderful. During the winter of 1885-86 many of those about me were reduced to mere skeletons through starvation, and, although they were helped as much as possible, several, it is to be feared, died not far from us. Some had eaten the skin covering of their bed, and were only saved by an occasional seal being killed and by the few lemmings they could catch under the snow. In one instance a case of what appeared to be economic hibernating was noted. Some distance from the Observatory a woman and her son were found closely huddled together in a house completely closed and not much larger than themselves. They said they had not had any food for some time, but expected friends in a few days. Leaving what food we had, we returned to the station, and extremely bad weather coming on some days afterwards, we had almost forgotten these people. Two weeks later we were reminded of them by an Eskimo having passed that way who said he had not seen them. Fearing they were dead, we went over with provisions, and much to our surprise found them, though little more than parcels of bones, perfectly well, and they declared they had lain there ever since. These people, with others, were soon stout and hearty when food became more plentiful.

In many of the narrow gravelly passes in the rocky hills, low walls were often noticed that had undoubtedly been built many years ago. These were in a straight line from one hill to another, and were usually nothing more than single stones about a foot high placed close to each other. Many conjectures as to their use were made, and, taking Ugaluk to one of these walls one day, he informed me that many years ago, when large numbers of Eskimo lived here, and wood was extremely scarce, some would bind sharp stones to their feet, and lying upon their backs behind these walls, others would drive the deer, which were then very numerous, and as the deer passed over the walls the hidden hunters would strike with their stone-tipped feet and would often kill many of them in this way. Regarding the scarcity of wood, it may be added that even now many Eskimo have not harpoons because they cannot procure a piece of wood large enough for a handle.

Having often heard of the dislike the Eskimo is believed to have to a white man exploring the graves of their dead, we determined to test this, and purposely went with several Eskimo, passing near where a number were buried. Here I stopped at one grave which had evidently long ago been visited by wolves or dogs, for the covering of stones had been dragged away and the bones were scattered in every direction. To my surprise the Eskimo looked on quite unconcernedly as I turned the skull and bones over with my stick, and, if anything, they seemed rather amused than otherwise. Suddenly I feigned an expression of fear, and while they looked at me made a bound forward, screaming as I fled. In a moment they were after me, screaming apparently in greatest terror. Soon stopping, however, I burst into laughter, and was immediately followed by all excepting the children, who evidently could not see the joke, nor would they return to the grave. During the remainder of my stay here we often examined other graves, but from a warm attachment for the dead, as well as for the living, not a bone was ever removed.

F. F. PAYNE.

Meteorological Office, Toronto, Ont.

Movement of the Higher Atmosphere.

If this question had been discussed previous to August 27, 1883, there would have been but one view expressed, and that would have been unanimous; namely, that the higher atmospheric layers have very little velocity, and if there is any motion it must necessarily be from the west toward the east. As it is universally admitted, even now, that the upper atmosphere has such a motion everywhere except in the equatorial regions, we need to give here some of the proofs that this law holds good for the latter region also.

1. A careful and elaborate theoretical discussion has shown the universality of the law. The merest outline of this discussion is as follows. The sun heats up the equatorial region more than the

circles of latitude on either side, and this causes a bulging, so to speak, of the atmosphere over this region. These air particles will have a tendency to flow off toward the north and south; but a particle going from the equator continually reaches a region that is revolving less rapidly, so that its course will be deflected toward the east. This discussion loses a good deal of its force, however, when we consider how exceedingly tenuous the atmosphere must be at a height of twenty miles. The barometric pressure would be less than one inch, and any motion of air particles in such a space due to their gravity must be exceedingly slow, if they move at all. If we should inquire as to the probable amount of heaping up in the air from the increased heat at the equator, we would see that it must be exceedingly slight. Above the height of seven or eight miles the changes in the temperature would be nothing, as the sun's influence is entirely dissipated there; moreover, the difference in temperature between the equator and a point at 30° north latitude would be so slight that this heaping up would be highly problematical.

2. We find these theoretical computations and views amply borne out by a study of the motion and velocity of the highest clouds. For days at a time no motion at all can be perceived in these clouds at the equator, and whenever it is noted it is always toward the east and very slow. Mr. Abercromby seems to have observed a motion of clouds toward the west, but this must have been seen in clouds at a lower level, which would move westward in the lower trade-wind. The evidence regarding the motion of these highest cirrus clouds comes by special correspondence with physicists at Batavia, Mauritius, the West Indies, and the Philippines, and is conclusive as regards this question.

3. In many cases volcanoes have projected ashes to enormous heights in the atmosphere, both in the West Indies and in Java. Some of these ashes have been carried a comparatively short distance toward the west by the lower trade current, but others have also been borne many hundreds of miles farther eastward by the upper current. A good example of this is given in an eruption of Krakatoa in May, 1883, in which ashes were carried twelve hundred miles to the eastward.

4. One of the best proofs that can possibly be had of the direction and velocity of the higher atmospheric strata would be seen in the cloud left by a meteor in its passage through the sky. In a recent meteor that fell in Iowa, in a perfectly clear sky, there was a most excellent opportunity of studying this question. This meteor left a beautiful whitish cloud, which was carefully watched by at least two observers. One of them saw it perfectly stationary, a little to the east of the zenith, for more than an hour. The other saw it over two hours, and it appeared to gradually diffuse itself in the atmosphere. It is easy to see that any appreciable motion would have made itself plainly manifest in the long time during which this cloud was visible.

We see that both theory and observation give no uncertain sound on this question, and up to Aug. 27, 1883, this may have been regarded one of the best ascertained and established facts of meteorology. On this date there occurred one of the fiercest volcanic outbursts ever known, at Krakatoa in Java. On Aug. 28 and succeeding dates there were seen most beautiful sky colorings at various points on the equator to the westward of Krakatoa, each appearance being at a later date the farther west one went. An enthusiastic astronomer at once suggested that a current of eighty miles per hour had borne the ashes of Krakatoa westward, and that the sky-glow was caused by diffraction and reflection from these mechanically distributed ashes. This seems to have been an unfortunate invasion of an unknown field, and must result in disaster. Every effort has been put forth by astronomer and physicist to force such a current, but with two or three exceptions no meteorologist has accepted this view. We have already seen how untenable it must be. There are other insuperable objections to this hypothesis, but these against the velocity and direction of the current are the most serious.

The Krakatoaists have hailed with delight a certain theoretical computation advanced quite recently by Professor Ferrel, and it will be well to pass upon it at some length. Professor Ferrel first shows conclusively that the tendency of the upper layers must be toward the east, and then, referring to the sky-glow, he tries to

show that there might be a westward motion, by the following reasoning. If the Krakatoa outburst had occurred at a time of year when the temperature was uniform on either side of the equator, say in March and September, then the motion must have been toward the east, but, after March 21 and until June 21, the sun gradually heats up, relatively more and more, portions of the earth to the north of the equator. In consequence of this the bulging of the upper atmosphere does not occur at the equator so much as at circles of latitude farther north. As a result the motion of air particles becomes reversed, that is, toward the equator and not away from it. This would give the particles a tendency to move toward the west,—Q. E. D. This certainly seems like vicious reasoning. In the first place the phenomena of the sky-glow continued until the second week in September, or within ten days of the time when, according to Professor Ferrel, the heat of the sun would have been uniform on either side of the equator, and the motion of the higher strata must have been toward the east if at all. This consideration alone shows how untenable this reasoning is.

In the second place, let us inquire what the utmost effect can possibly be when the sun is at his farthest north. It should be noted that this heating effect is not directly upon the atmosphere, but the sun first heats the earth's surface, and that in turn the air above it, and so on. If we can find the air temperature at the earth at various latitudes we can reason from that as to the probable heating of the air at some height above the earth. It is quite difficult to determine the heat upon a complete circle of the equator, but, if we take the islands of the sea, we may make an approximation to the true value. The following table gives the temperature of the air at various points:—

Place.	Latitude.	Temperature (Fahrenheit).		
		March.	July.	August.
St. Thome.	0° 20' N.	78°	76°	76°
Batavia.	6 S.	79	78	79
Singapore.	1 17 N.	84	82	80
Mean.	Equator.	80	79	78
St. Beneto.	12 37 N.	80	72	72
Cape Verde Islands.	14 54 N.	82	85	86
Jamaica.	18 3 N.	70	75	74
Porto Rico.	18 18 N.	77	82	82
Kanal.	22 15 N.	70	76	77
Canary Islands.	28 4 N.	63	69	70

It will be noticed at once that the high temperature of the Cape Verde Islands is due to the proximity of the African coast. It is also true that the exposure of the thermometer is not uniform at these localities. Making due allowance for all irregularities, however, we still find the most remarkable fact, that the air at the earth's surface in July and August is actually at a higher temperature on the equator than at a latitude of 23° where the sun may be supposed to be the hottest. This shows conclusively that this seeming heaping up of the air, to the north of the equator, owing to an increased heat from the sun's apparent motion northward in July, is entirely mythical; and the only effect that can possibly supervene upon the higher atmosphere must be a motion to the eastward, in all parts of the year, and in the equatorial regions as well as to the northward.

The question will arise, How can these remarkable sky-glow be accounted for? This question does not properly come into this discussion, but a partial answer may be given. The sky-glow were a marked intensification of ordinary sunset phenomena, which it is well known are due to moisture particles. In order that these glows might be seen at their best the following circumstances were necessary. (1) An abundance of moisture particles at great heights. (2) A clear sky. (3) An abundance of electricity in the air, which would cause the moisture particles to be repelled. We know that the occurrence of such an eruption as

that at Krakatoa does set free an enormous amount of electricity. If any one of these were lacking the glow would diminish or disappear. It is known that the glows were of an intermittent character. That the action should have taken place at great velocity from east to west is not at all incredible. Whatever may have been the cause of these glows, we may be absolutely certain that they were not the effect of sun-light upon ashes or products of combustion mechanically distributed by a rapid current from east to west.

H. A. HAZEN.

Washington, D.C., Aug. 8.

BOOK-REVIEWS.

The Ethical Problem. By Dr. PAUL CARUS. Chicago, Open Court Pub. Co. 12°. 50 cents.

THIS pamphlet contains three lectures recently delivered before the Chicago Society for Ethical Culture, together with some preliminary matter on the same theme. Dr. Carus is deeply impressed with the importance of a new basis for ethics, the old traditional foundations having proved insufficient. He maintains, in opposition to many leaders of the ethical societies, that a correct theoretical basis of moral action is indispensable, a view with which we cordially agree; and he tells those societies plainly that, unless they supply such a basis, their movement will come to naught. "How can we," he asks, "have a common aim in the 'elevation of the moral life,' if we are not agreed upon what a moral life is, if our philosophical opinions about good and bad differ?" Accordingly he has prepared these lectures with the apparent purpose of furnishing a basis of ethics, but, we are sorry to say, without success. Indeed, he hardly makes a serious attempt to solve the problem; but contents himself with talking around it and about it, without ever coming to the point. He rejects all the theories of other men, theological, intuitional, utilitarian, and otherwise, and maintains that ethics must be based on "facts"; but what the true basis is he nowhere informs us. Indeed, we have seldom met with a more unsatisfactory treatment of the question at issue, and we cannot see that Dr. Carus has made any real advance from the position of the ethical societies.

AMONG THE PUBLISHERS.

D. C. HEATH & Co., Boston, have in press, to be published about Aug. 15, a new number in the series of Guides for Science Teaching, published under the auspices of the Boston Society of Natural History. The book is entitled "Insecta," and is written by Professor Hyatt, curator of the Natural History Society. It will be extensively illustrated with engravings from drawings made specially for the work.

—Scribner & Welford have the exclusive agency for America of the library edition of Moncure D. Conway's "Life of Hawthorne," published in England in the Great Writers series. This is printed on larger paper, and, in general, is gotten up more sumptuously than the twelvemo edition.

—Frank Vincent, the well-known traveller and author, "in recognition of his distinguished services to the literature of travel," has received from the Emperor of Austria the great gold medal for art, literature, and science. This is the second honor Mr. Vincent has received from Vienna, having, a few years ago, been elected a corresponding member of the Austria Geographical Society.

—Messrs. Longmans, Green & Co. have published a volume of short pieces by the late Richard Jefferies, entitled "Field and Hedgerow." It contains more than twenty essays, mostly on topics suggested by rural scenes and events; but for what purpose such works are written and read we do not know. There is nothing in the book but trifling descriptions of natural objects, written in a disagreeable style, with occasionally some brief remark on moral or artistic themes. We look in vain for any contribution to our knowledge of nature, either in its scientific or its esthetic aspect; while the author's remarks on higher themes are singularly vapid and profitless. It may be that somebody will derive either

amusement or instruction from the pages of this book, but we don't admire the mental equipment of the man who can do so.

—A readable account of the building up and washing away of the narrow sandy islands near Sandy Hook, Long Branch, and Cape May, illustrating similar action that is going on all along our eastern shores, will appear in the *Popular Science Monthly* for September. The article is by F. J. H. Merrill, and is entitled "Barrier Beaches of the Atlantic Coast."

—The Open Court Publishing Company have published "Three Lectures on the Science of Language," by F. Max Müller. They were originally delivered at the Oxford University extension meeting in 1889, and are, of course, of a somewhat elementary character. They give a brief summary of the leading facts about the nature of language, with remarks on the importance of studying it; and are specially designed to awaken an interest in the subject on the part of inquiring minds. The most interesting part of the book to scientific readers will be the passage in which the author discusses the relative merits of the two methods of classifying the races of men, by language and by physiological characteristics. He maintains that physiological classification has proved a failure, and that classification by language must be adopted, though with some reservations. Professor Müller reaffirms his theory of the origin of the Aryans in Central Asia, but without presenting anything new. The concluding paper in the book is a brief account of the earlier thinkers who have held Professor Müller's views as to the identity of language and thought. We may note in conclusion that the book is printed throughout in blue ink.

—D. C. Heath & Co., Boston, will publish in September a "Brief Course in the Elements of Chemistry," by James H. Shepard, professor of chemistry, South Dakota Agricultural College, and chemist to the United States Experiment Station. This book will be on the same plan as the author's "Elements of Inorganic Chemistry." It is not a fragmentary compilation, but gives the

student a concise and comprehensive view of the main formulas of chemical science. The experiments are easily performed and bear directly upon the subjects under consideration, while the apparatus and chemicals required are as inexpensive as thorough work will permit. The book is well adapted to the needs of schools where the time is limited and where the teacher aims to do most of the work, but it will find a warm welcome in schools possessing working laboratories. The carbon compounds are tersely treated, thus giving the student an insight into the fundamentals of organic chemistry.

—The yield of gold in New South Wales in 1889, as shown by the "Annual Report of the Department of Mines," was larger than that for any year since 1883, amounting to over 182 million dollars.

—The United States Steamer "Thetis," Lieut Commander Stockton commanding, was detailed by the Navy Department to cruise, during the summer and autumn of 1889, in Behring Sea and the Arctic Ocean. During this cruise, in order to make its results as useful as possible, several of the officers on board the "Thetis" were directed to prepare reports upon subjects connected with the waters and regions visited by the ship, from their observation and from other reliable sources. One of these reports, by John W. Kelly, is on the ethnography of the Eskimos; and another, by Ensign Roger Wells, jr., is an Eskimo vocabulary, prepared almost entirely from information and material furnished by John W. Kelly, who spent three winters among the north-western Eskimos, and who has been engaged for seven years, at various times, in acquiring a knowledge of their language. The manuscripts of these two reports were presented to the Bureau of Education at Washington by Commander Stockton, to whose intelligent foresight the preparation of the reports was due. The Bureau, being charged with the supervision of education in Alaska, and the Commissioner of Education, W. T. Harris, appreciating the

MACMILLAN & CO.'S

New Scientific Publications.

THE THEORY OF LIGHT.

By THOMAS PRESTON,

Lecturer in Mathematics and Mathematical Physics, University College, Dublin.

8vo, pp. 16, 465. With Illustrations. Cloth, \$3.25.

"I have been induced to undertake the present work with the hope of furnishing the student with an accurate and connected account of the most important optical researches from the earliest times up to the most recent date. The text contains in addition to the physical theory, a detailed account of the most important experiments and physical measurements, such as the determination of the velocity of light, wave lengths, refractive indices, etc., etc."—*Extract from Preface.*

NEW AND REVISED EDITION. NOW READY.

LESSONS IN ELEMENTARY CHEMISTRY.

INORGANIC AND ORGANIC.

By SIR HENRY E. ROSCOE, D.C.L., LL.D., F.C.S.,

Professor of Chemistry in Owens College, Manchester.

16mo, pp. XI., 459. With numerous Illustrations. Cloth, \$1.10.

"We unhesitatingly pronounce it the best of all our elementary treatises on Chemistry."—*Medical Times.*

* * * Macmillan & Co.'s New Catalogue of Publications will be sent free by mail to any address, on application.

MACMILLAN & CO., 112 Fourth Ave., N. Y.

PRACTICAL ELECTRICAL NOTES AND DEFINITIONS.

For the use of engineering students and practical men by W. P. MAYCOCK, together with Rules and Regulations to be observed in Electrical Installation Work, with diagrams. 120 pages, 32mo, cloth, 60 cts. E. & F. N. SPON, 12 Cortlandt St., New York.

HEAVEN AND HELL. 416 p., paper. **DIVINE LOVE AND WISDOM.** 388 p., paper. By EMANUEL SWEDENBORG. Mailed, prepaid, for 14 cents each (or 25 cents for both), by the American Swedenborg P. and P. Society, 20 Cooper Union, N. Y. City.

BOOKS: How to get them. If there is any book or pamphlet that you want, write to the Science Book Agency, 47 Lafayette Place, New York.

Old and Rare Books.

Back numbers Atlantic, Century, Harper, and Scribner, 10 cents per copy, other magazines equally low. Send for a catalogue.

A. S. CLARK,

Bookseller,

34 Park Row, New York City.

BACK NUMBERS and complete sets of leading Magazines. *Rates low.* AM. MAG. EXCHANGE, Schoharie, N. Y.

BOOKS: How to Exchange them for others. Send a postal to the SCIENCE exchange column (insertion free), stating briefly what you want to exchange. SCIENCE, 47 Lafayette Place, New York.

Practical Drawing Courses,

PUBLISHED BY THE

American Book Company.

BARTHOLOMEW'S DRAWING SERIES.

A complete course carefully adapted to all grades. Primary Course—4 numbers. Grammar Course—9 numbers. High School Course—5 numbers.

ECLECTIC INDUSTRIAL DRAWING SERIES.

Comprising 9 numbers perfectly graded. The Eclectic System is designed to furnish the necessary basis for special training in the advanced drawing courses.

KRÜSI'S DRAWING SERIES.

Free-hand, Inventive, Industrial, Graded Course. Synthetic Series—4 numbers and manual. Analytic Series—4 numbers and manual. Perspective Series—4 numbers and manual. Krüsi's Drawing also carries the study into the advanced courses in Mechanical Drawing, Elementary Architecture, Textile Designs, and Outline and Relief Designs.

WHITE'S INDUSTRIAL DRAWING (Revised).

Simple, Practical, Complete, Easily taught. It is the "Alphabet of Manual Training."—A new and complete course comprising 18 numbers carefully graded.

Send for full descriptive circulars and complete price-list.

American Book Company, 806 & 808 Broadway, New York.
137 Walnut St., Cincinnati. 258 & 260 Wabash Ave., Chicago.

value of all means or appliances that will tend to promote a better understanding of, and an easier communication with, the native races in that Territory, the reports have been published as Bureau of Education Circular of Information No. 2, 1890, under the title, "English-Eskimo and Eskimo-English Vocabularies, preceded by Ethnographical Memoranda concerning the Arctic Eskimos in

Alaska and Siberia." The vocabulary is believed to be the most complete of its kind yet prepared. The book will be of great service, not only to the teachers, for whom it is primarily intended, but also to officers of the navy and of the revenue marine service, government officials in Alaska, and all others interested in the study of the Eskimo language.

Dyspepsia

Horsford's Acid Phosphate.

In dyspepsia the stomach fails to assimilate the food. The Acid Phosphate assists the weakened stomach, making the process of digestion natural and easy.

Dr. R. S. McComb, Philadelphia, says: "Used it in nervous dyspepsia, with success."

Dr. W. S. LEONARD, Hinsdale, N. H., says:

"The best remedy for dyspepsia that has ever come under my notice."

Dr. T. H. ANDREWS, Jefferson Medical College, Philadelphia, says:

"A wonderful remedy which gave me most gratifying results in the worst forms of dyspepsia."

Descriptive pamphlet free.

Rumford Chemical Works, Providence, R. I.

Beware of Substitutes and Imitations.

CAUTION.—Be sure the word "Horsford's" is printed on the label. All others are spurious. Never sold in bulk.

FREE.

OUR 100 PP. CATALOGUE OF MINERALS. Illustrated with 57 cuts, and containing (a) Scientific Papers and Notes, 41 pp.; (b) A Classified List of All Mineral Species, giving chemical composition and crystallographic form, 31 pp.; (c) An Alphabetical Index of some 3,000 mineralogical names. Paper-bound copies free to those mentioning this journal; handsome cloth-bound copies, 25 cents, postpaid. GEO. L. ENGLISH & CO., Dealers in Minerals, 1512 Chestnut street, Philadelphia; 739 & 741 Broadway, New York.

WORCESTER POLYTECHNIC INSTITUTE Courses in Civil, Mechanical and Electrical Engineering and Chemistry. A new Course in Physical and Political Science proposed. For catalogue address H. T. FULLER, Ph.D., Worcester, Massachusetts.

JOHNS HOPKINS UNIVERSITY,
BALTIMORE.

Announcements for the next academic year are now ready and will be sent on application.

MICHIGAN, Houghton.

Michigan Mining School.

A State School of Surveying, Mining, Electrical and Mechanical Engineering, Physics, Chemistry, Assaying, Ore Dressing, Mineralogy, Petrography, Geology, Drafting, Machine Design, etc. Tuition free. For catalogues and information address

M. E. WADSWORTH, A.M., Ph.D., Director.

THE MUTUAL LIFE INSURANCE COMPANY OF NEW YORK.

RICHARD A. McCURDY, President.

THE LARGEST, BEST AND MOST POPULAR
LIFE INSURANCE COMPANY IN
THE WORLD.

Assets January 1st, 1890, \$136,401,328.02

New Business in 1889, - 151,602,483.37

Annual Income, - - - 31,119,019.62

Purely Mutual.

No Stockholders.

NO OTHER COMPANY HAS SHOWN
RESULTS SO PROFITABLE AND GRAT-
IFYING TO POLICY-HOLDERS.

ITS POLICIES ARE THE MOST
LIBERAL AND DESIRABLE
ISSUED.

It has Paid Policy-holders since Organization

\$287,681,948.20.

The Twenty Year Distribution Policy
issued by The Mutual Life Insurance
Company is a Model Contract.

The Company's Policies are now held by
182,310 Members.

OF WHAT USE IS THAT PLANT?

You can find the answer in

**SMITH'S "DICTIONARY OF
ECONOMIC PLANTS."**

Sent postpaid on receipt of \$2.80. Publish-
er's price, \$3.50.

SCIENCE BOOK AGENCY,
47 Lafayette Place, New York.

A New Method of Treating Disease.

HOSPITAL REMEDIES.

What are they? There is a new departure in the treatment of disease. It consists in the collection of the specifics used by noted specialists of Europe and America, and bringing them within the reach of all. For instance, the treatment pursued by special physicians who treat indigestion, stomach and liver troubles only, was obtained and prepared. The treatment of other physicians celebrated for curing catarrh was procured, and so on till these incomparable cures now include disease of the lungs, kidneys, female weakness, rheumatism and nervous debility.

This new method of "one remedy for one disease" must appeal to the common sense of all sufferers, many of whom have experienced the ill effects, and thoroughly realize the absurdity of the claims of Patent Medicines which are guaranteed to cure every ill out of a single bottle, and the use of which, as statistics prove, *has ruined more stomachs than alcohol.* A circular describing these new remedies is sent free on receipt of stamp to pay postage by Hospital Remedy Company, Toronto, Canada, sole proprietors.



DO YOU INTEND TO BUILD?

We offer an Atlas of **Sensible Low Cost Houses**, a portfolio 11x14 inches, containing **handsome illustrations**, floor plans, and full descriptions of this popular design, and fifty-four others, ranging in cost from \$800 to \$7,200. This specimen design is for a cottage with seven rooms, and costing \$1,100. It combines beauty and comfort, has two large porches, and is a popular and practical working design, having been built several times for its estimated cost.

No matter what style of a house you may intend to build, it will pay you to have this book.

We will send this Atlas, postpaid, on receipt of price, \$1.—N. D. C. HODGES, 47 Lafayette Place, New York.

THE WINNIPEG COUNTRY;

OR,

ROUGHING IT WITH AN ECLIPSE PARTY.

BY

A. ROCHESTER FELLOW.

(S. H. SCUDDER.)

With thirty-two Illustrations and a Map.
12°. \$1.50.

"The story is a piquant, good-humored, entertaining narrative of a canoe voyage. A neater, prettier book is seldom seen."—*Literary World.*

"This is a sprightly narrative of personal incident. The book will be a pleasant reminder to many of rough experiences on a frontier which is rapidly receding."—*Boston Transcript.*

"The picture of our desolate North-western territory twenty-five years ago, in contrast with its civilized aspect to-day, and the pleasant features of the writer's style, constitute the claims of his little book to present attention."—*The Dial.*

N. D. C. HODGES, PUBLISHER,

47 LAFAYETTE PLACE, NEW YORK.

To mend a piece of old Chinese or Japanese lacquer which has chipped away from the wood, first fill the space with white lead stiffened with copal varnish; when this is hard, polish it down to the general level of the surface; then, according to the nature of the ground, color with India ink or gild, or cover with brown varnish mixed with gold dust to imitate aventurine.

CATARRH.

Catarrhal Deafness—Hay Fever.

A NEW HOME TREATMENT.

Sufferers are not generally aware that these diseases are contagious, or that they are due to the presence of living parasites in the lining membrane of the nose and eustachian tubes. Microscopic research, however, has proved this to be a fact, and the result of this discovery is that a simple remedy has been formulated whereby catarrh, catarrhal deafness and hay fever are permanently cured in from one to three simple applications made at home by the patient once in two weeks.

N.B.—This treatment is not a snuff or an ointment; both have been discarded by reputable physicians as injurious. A pamphlet explaining this new treatment is sent free on receipt of stamp to pay postage, by A. H. Dixon & Son, 337 and 339 West King Street, Toronto, Canada.—*Christian Advocate*.

Sufferers from Catarrhal troubles should carefully read the above.

Have you a friend who, for fashion's sake, submits to physical deformity? Would he or she not be interested in Professor Flower's "Fashion in Deformity?"

Sent postpaid on receipt of 50 cents.

SCIENCE BOOK AGENCY

47 Lafayette Place, New York.

A TEMPORARY BINDER

for *Science* is now ready, and will be mailed postpaid on receipt of 75 cents.



This binder is strong, durable and elegant, has gilt side-title, and allows the opening of the pages perfectly flat. Any number can be taken out or replaced without disturbing the others, and the papers are not mutilated for subsequent permanent binding. Filed in this binder, *Science* is always convenient for reference.

Temporary binders of the same description but without side title, to fit any paper or periodical of ordinary size, will be mailed postpaid on receipt of price as given below. In ordering, be sure to give the name of paper or periodical and style of binder.

8 to 12 inches long, cloth, \$0.50; leather, \$0.60.	
12 " 14 " " " 60 " 75.	
14 " 17 " " " 75 " 1.00.	
17 " 19 " " " 1.00 " 1.25.	

N. D. C. HODGES, 47 Lafayette Place, New York.

RUPTURE

cured in stipulated time.

NO DELAY FROM WORK. NO OPERATION.

Call or send stamp for circular and reference of those cured. We have on hand over 300 styles of trusses, from \$1 up, and suspensories of all kinds. Orders filled by mail or express to any part of the United States.

C. A. M. BURNHAM, M.D.,
138 Clinton Place, New York.

N. D. C. HODGES, 47 Lafayette Pl., New York,
Announces as Just Published

Fact and Theory Papers

THE SUPPRESSION OF CONSUMPTION.

By GODFREY W. HAMBLETON, M.D. 12°. 40c.

"The inestimable importance of the subject, the eminence of the author and the novelty of his work all combine to render the little treatise worthy of special consideration. . . . We heartily commend Dr. Hambleton's booklet and wish there were more such works."—*Editorial, Boston Daily Advertiser*.

"The monograph is interesting in style, scholarly, and well worth of careful consideration. It is devoid of technical expressions, and can be easily read and digested."—*Pharmaceutical Era*.

"It is full of facts and wisdom."—*Philadelphia Saturday Evening Post*.

"The book contains much of importance to the medical fraternity, as well as the general populace."—*Burlington Hawkeye*.

"We commend the book to physicians and laymen."—*Herold (German), Milwaukee*.

THE SOCIETY AND THE "FAD."

By APPLETON MORGAN, Esq. 12°. 20 cents.

"Mr. Morgan founds a sensible and interesting address upon a text furnished by a sentence from a young ladies' magazine; namely, 'Browning and Ibsen are the only really dramatic authors of their century.'"—*New York Sun*.

In the little book before us the treatment of the subject is dispassionate and logical. The comparison drawn throughout this monograph is between Shakespeare and Browning, the subject-matter being largely based on the Browning and Shakespearian societies and how they came to exist. A pleasant half-hour or more may be spent over the book, and some useful information derived from it."—*Englewood Times*.

"To say nothing of the dissection of Browning, the vivid side-lights thrown upon Shakespeare's life and work make the reading of this volume at once a pleasure and a source of instruction."—*Chicago Evening Journal*.

PROTOPLASM AND LIFE.

By C. F. COX. 12°. 75 cents.

The author of this book was for some years president of the New York Microscopical Society, and in this volume he sets forth his views on the spontaneous generation theory and its relation to the general theory of evolution, and on protoplasm and the cell doctrine.

Ready at an early date.

THE CHEROKEES IN PRE-COLUMBIAN TIMES

By CYRUS THOMAS. 12°. \$1.

Dr. Thomas in this work will reverse the usual method of dealing with prehistoric subjects; that is to say, he will commence with the earliest recorded history of the tribe as a basis, and trace the chain back step by step by the light of the mounds, traditions, and other evidence, as far as possible. He has already presented to the public some reasons for believing the Cherokees were mound-builders, but additional evidence bearing on the subject has been obtained. A more careful study of the Delaware tradition respecting the Tallegwi satisfies him that we have in the Bark Record (Walam Olum) itself proof that they were Cherokees. He thinks the mounds enable us to trace back their line of migration even beyond their residence in Ohio to the western bank of the Mississippi. The object is therefore threefold: 1. An illustration of the reverse method of dealing with prehistoric subjects; 2. Incidental proof that some of the Indians were mound-builders; 3. A study of a single tribe in the light of the mound testimony. This work will be an important contribution to the literature of the Columbian discovery which will doubtless appear during the coming two years.

THE TORNADO.

By H. A. HAZEN. 12°. \$1.

Professor Hazen is one of the prominent meteorologists connected with the United States Signal Office. In this work he reviews our present information as to tornadoes, severely criticising some of the opinions held in regard to them up to this time. No one has given a more careful study to these destructive storms than has Professor Hazen, and his book will prove a decided contribution to the world's knowledge. In this book will be found a careful discussion of the important question of Tornado Insurance now attracting so much attention. Hundreds of dollars may be saved by people who are thinking of such insurance by following the principles here made plain.

BOOKS: How to get them. If there is any book or pamphlet that you want, write to the Science Book Agency, 47 Lafayette Place, New York.

Wants.

Any person seeking a position for which he is qualified by his scientific attainments, or any person seeking some one to fill a position of this character, be it that of a teacher of science, chemist, draughtsman, or what not, may have the "Want" inserted under this head FREE OF COST, if he satisfies the publisher of the suitable character of his application. Any person seeking information on any scientific question, the address of any scientific man, or who can in any way use this column for a purpose consonant with the nature of the paper, is cordially invited to do so.

TO PRINCIPALS OR COMMITTEES.—Professor of Classics and Sciences, experienced in advertising and building up schools, now employed, desires change. WILLIAM, Roslyn, L. I.

WANTED.—A graduate from the Advanced Course of the Framingham State Normal School desires an assistant's position in a high school. An appointment in New England preferred. Address G., Lock Box 4, Framingham, Mass.

HYBRIDS.—A. M. Suchetet, 10 Rue Alain, Rouen, France, desires to correspond with those possessing hybrids, either living specimens or stuffed, of mammals, birds or other animals.

WANTED.—A Mining Engineer of standing and experience. One having had practical experience in Coal Mining and the manufacture of Coke preferred. Address A., care "SCIENCE."

CHEMIST.—A Harvard Graduate and Specialist in Chemistry desires a position with some manufacturing industry, or with a practical chemist. He would make an engagement to take charge of a laboratory and lecture on Chemistry. He has had large experience in the laboratory and school-room, and can give the best of references. Address J., Harvard College, Cambridge, Mass.

WANTED.—A Lady Teacher, at present teaching in England, with 12 years of very successful experience in primary work, desires a similar position in America. An appointment in the State of Ohio, or the City of New York, preferred. Excellent references, etc. Address in July or August, L. DUNCAN, Poste Restante, Stainland, Halifax, England.

WANTED.—The latest and most reliable authorities on the Occurrence, Analysis, and Practical Uses of Native Hydro-Carbons, such as Bitumen, Asphaltum, Mineral Wax, etc. Address Dr. J. E. TALMAGE, Box 1,047, Salt Lake City, Utah.

A ZOOLOGIST, acquainted with the United States, graduate (Ph.D. Freiburg, B.Sc. of an English university) of many years' standing; late Fellow of an English college; late assistant to a German university, professor of Comp. Anatomy; many years a student at two German universities; pupil of Huxley, Kölliker, Semper, Wiedersheim and Weismann; author of many well-known memoirs on Comp. Anatomy and Embryology; thoroughly conversant with all branches of the subject; fond of teaching, with good testimonials, seeks a Professorship. Address "MORPHOLOGIST," Office of SCIENCE. Other information and a few testimonials can be seen at the Office of SCIENCE.

Exchanges.

[Free of charge to all, if of satisfactory character. Address N. D. C. Hodges, 47 Lafayette Place, New York.]

I wish to exchange Riley's Missouri Reports, either singly or full set, for Proceedings Entomological Society, Philadelphia, vols. 2 to 6 inclusive. Will also exchange Casey's Revision of the *Stenini* of N. A. and Horn's Revision of the *Tenebrionidae*. F. M. Webster, La Fayette, Ind.

I wish to exchange a fresh and complete set of Weiss and Spier's "Necropolis of Ancon" for other books, either new or second-hand, if the latter are in good condition. What have you to offer? Address Warren Watson, Kansas City, Mo.

1,000 botanical specimens representing 250 genera in exchange for those not in my collection. Send list of duplicates, and receive a similar one to choose from. Address E. E. Bogue, Orwell, Ashta Co., Ohio.

For exchange—14 volumes (1883-1889) American Journal of Science, 10 volumes (1880-1889) American Naturalist, 21 volumes (1879-1890) English Mechanic, all in good condition for binding; also, Morris Typewriter. Wants first-class microscope, camera, chemical or physical apparatus. Address, with full particulars, E. R. Chadbourn, Lewiston, Maine.

Meteorites.—Mr. George F. Kunz, 11 to 15 Union Square, New York, or Hoboken, N. J., will buy or give in exchange for whole or parts of meteorites. Whole ones, undescribed ones, and entire falls especially desired.

Wanted.—To furnish roots of *Dodecatheon Meadia*, *Sarracenia purpurea*, and other wild flowers, native of Southern Wisconsin, in quantities. D. E. Willard, Curator of Museum, Albion Academy, Albion, Wis.

I have a number of duplicates of microscopic slides, mostly botanical, which I would like to exchange for others not now in my collection. Send list of what you have to exchange and get my list. S. R. Thompson, New Wilmington, Pa.